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APPLICATION FOR UNITED STATES LETTERS PATENT

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

Be it known that we, Kevin Curtis Mowry, a citizen of the
United States, residing at 9703 Windy Hollow Drive, Irving, TX 75063,
James B. McGuire, a citizen of the United States, residing at 22 Grove Way,
Delray Beach, FL 33444, and Jonathan James Main, a citizen of Australia,
residing at 2 Hoddington Farm Cottages, Upton Grey, Hants UK RG25 2RT,
have invented a new and useful "Method and Apparatus for Enabling an
External Function from a WAP Environment", of which the following is a
specification.

METHOD AND APPARATUS FOR ENABLING AN EXTERNAL FUNCTION FROM A WAP ENVIRONMENT

Field of the Invention

5 The invention relates generally to wireless web applications, and more particularly to a method and apparatus for enabling an external environment or application within a wireless application protocol (WAP) environment.

Background of the Invention

10 Wireless communication networks, such as cellular telephone communication networks, are commonplace. Wireless communication networks may comply with one or more standards or recommendations, such as the Global System for Mobile communication (GSM), code division multiple access (CDMA), time division multiple access (TDMA), General Packet Radio
15 Service (GPRS), 3rd Generation Cellular (3G) and various evolutions and modifications of these standards. The structure and function of networks constructed in accordance with one or more of these standards are well defined by the governing standard. Having evolved from networks dedicated primarily to voice communication, wireless communication networks provide a
20 broad range of services such as voice and data communication services including Internet, email and other packet data services.

 Like the communication network, the mobile stations, the equipment used to access communication services via the communication network must comply with standards and requirements. These standards and requirements
25 define the physical aspect of the communication link between the mobile station and the communication network as well as the form of the data and information to be communicated via the communication link. In addition to the standards governing the manner in which the mobile station communicates with the communication network, there further exist standards relating to the
30 implementation of functionality within the mobile station.

 The Wireless Application Protocol (WAP) is a communication protocol and an application environment that is designed to work with most wireless communication networks. WAP provides service interoperability over a wide range of devices and applications. Particularly, WAP enables wireless access
35 to services such as Internet information in consideration of the limitations of

the wireless communication environment, such as screen size, graphics capability, bandwidth and the like.

As mentioned above, WAP defines both an application environment as well as a communication protocol. Thus, applications are created specifically

5 to execute within the WAP environment. A typical WAP application consists of Wireless Markup Language (WML) and WML Script. As a result, applications not created for the WAP environment are incompatible and cannot be executed within the WAP environment. To expand the feature offerings available within the WAP environment, it has been contemplated to
10 provide an External Functionality Interface (EFI). The purpose of the EFI is to provide a standard way of discovering external functionality outside of the WAP environment, whether resident inside or outside the mobile station. However, neither the WAP standard nor the EFI define the interaction between the WAP environment and the external functionality, and particularly
15 the external application.

Thus, there is a need for a method and apparatus for enabling an external functionality from within the WAP environment.

Brief Description of the Drawings

20 FIG. 1 is a block diagram of a WAP enabled communication device that may be adapted in accordance with the preferred embodiments of the invention.

FIG. 2 is a block diagram illustrating the process by which an external environment is enabled with a WAP environment according to the preferred
25 embodiments of the invention.

FIG. 3 is a flow chart illustrating a method for enabling an external environment from within a WAP environment in accordance with a preferred embodiment of the invention.

Detailed Description of the Preferred Embodiments

A wireless communication device includes a Wireless Application Protocol (WAP) operating environment (a "WAP browser") that is capable of executing WAP applications. A WAP application running within the WAP browser is able to discover, launch and control external applications, such as JAVA applications. The external application is executed in an external environment separate from the WAP application environment. To interact with the WAP environment, the external application must initiate a connection to the WAP application, which is accomplished via an external function interface (EFI). The EFI, in turn, provides a handle to the connection back to the WAP application. The handle is used by the WAP application to control the external application, e.g., suspend, resume or terminate it, or to send information to or receive information from the external application.

The external application must initiate a connection to the EFI. This may be accomplished in a number of ways, including incorporating code directly into the external application that initiates the connection or invoking a library call from the external application that establishes the connection.

A method for executing an external application from a WAP application is also provided. The method includes the steps of establishing a connection from the external application to the WAP application via an EFI and providing an handle to the WAP application for controlling the external application. The connection may be established by incorporating code directly into the external application that initiates the connection or by invoking a library call from the external application that establishes the connection.

Referring to FIG. 1, a wireless communication device 10 is configured to operate in accordance with one or more wireless communication standards. The wireless communication device 10 may be any type of device configured to access communication services from a servicing communication network including, without limitation, a cellular telephone, a pager, a wireless enabled personal digital assistant, a wireless enabled personal computer devices and the like. While the physical configuration of the wireless communication device is not particular to the present invention, such devices typically include a processor and a memory including a control program for directing the operation of the processor (not depicted) to enable operation of the wireless

communication device 10 to access communication services from the communication network.

Functional elements of the wireless communication device 10 may include operatively coupled a transceiver 12, a user interface 14 and a WAP browser 16. The WAP browser may be implemented as computer code retained within a memory of the communication device 10 to direct the processor to operate in conjunction with the user interface 14 to provide a WAP operating environment. The WAP browser 16 functions consistently with the WAP standard to enable WAP application operation within the wireless communication device 10. The transceiver 12 provides the physical interface of the wireless communication 10 with the communication network using one or more communication resources. The user interface 14 may include an audio interface including a speaker and microphone, a graphic display and an input device such as a keypad, touch screen or voice interface.

On occasion, it may become necessary or desirable to enable an external function from within the WAP browser 16. For example, a WAP application may be provided within the wireless communication device 10 that provides to the user a navigation feature. To facilitate the navigation feature, the wireless communication device 10 needs to have available data reflecting its current location. An application could be written to operate within the WAP environment to determine the necessary location information. However, functions within the wireless communication device 10, but apart from the browser 16, are already capable of determining or acquiring location information, which is often necessary for proper operation of the wireless communication device 10 within the wireless communication network. Thus, it would be useful and advantageous to allow the WAP navigation application to access the location function of the wireless communication device 10.

Referring to FIG. 2, in order to invoke an external application from within the WAP environment, the WAP application 20, from within the WAP browser 16, sends a request to launch an external application (1) to an external function interface (EFI) 22. The request includes an identification of the requested application as well as any necessary parameters, e.g., p1 and p2, associated therewith. The WAP application 20 calling the external application may be any type of application including the navigation feature

described above. In this manner, the WAP application 20 uses the EFI 22 to invoke the external application.

The EFI 22 sends a launch external application message (2) to an External Function (EF) unit 24 supporting the requested external application.

5 The message may be a "handleInvoke" message indicating to the EF unit 24 to launch (3) the requested external application 26 and to return a handle. In order for the requested external application 26 to operate within the WAP environment, it is necessary for the external application 26 to establish a connection back to the EFI 22.

10 Once the requested external application 26 has established the connection to the EFI 22, the external application 26 is registered (4) with the WAP application. Additionally, a handle (5) is returned to the requesting WAP application 16. The handle provides the WAP application 16 the information necessary for it to control the external application. For example, the handle
15 allows the WAP application 16 to suspend, resume or terminate operation of the requested application. The handle also allows the WAP application 16 to send information to and to receive information from the external application 16. The requesting WAP application 16 then uses the handle to manage the external function from within the WAP environment. For example, the
20 external function may be an asynchronous call. The WAP application 16 may use the handle to inquire, via the EFI 22, the status of the external application 26 as well as to obtain any requested parameters to be returned from the external application 26. As will be appreciated, a handle is generated for each external application called by a WAP application, and each handle is
25 made available to the corresponding requesting WAP application.

On initialization of the wireless communication device 10, the EFI 22 may identify available external functions and maintain a list of the available functions. The list allows the EFI 22 to send the launch message to the appropriate EF unit for launching the requested external application. If the
30 requested external application is not contained on the list of external applications, an error message is returned to the requesting WAP application. Alternatively to identifying available external functions on device initialization, as a new external function is installed in the wireless communication device

10, the EFI 22 may identify the existence of the new external application and add it to the list. The EFI 22 may further periodically update the list.

A library may be provided as part of either the EF unit 24, the external application 26 or as a standalone element (not depicted). In essence, the library provides the information necessary to establish the connection between the external application and the requesting WAP application, which allows the external application to operate via the WAP browser 16 virtual machine (not depicted). The library information may be available generally for use by developers seeking to add WAP-enabled external applications on particular wireless communication devices. In the case of JAVA applications, for example, the external application may be written once, and adapted to run within the WAP environment on the virtual machine without modification by using the configuration information available in the library. Alternatively, the necessary configuration information may be written directly into the external application.

Referring to FIG. 3, a method for enabling an external application within a WAP environment begins at step 302 up receipt of a request from a WAP application to invoke an external application. In response to the request, at step 304, a library provides information necessary to configure the external application for operation from the WAP environment. At step 306, a handle is generated that permits the external application to be controlled from within the WAP application, and the handle is returned to the WAP application.

While the invention is susceptible to various modifications and alternative constructions, certain illustrative embodiments thereof have been shown in the drawings and are described in detail herein. It should be understood, however, that there is no intention to limit the disclosure to the specific forms disclosed, but on the contrary, the intention is to cover all modifications, alternative constructions and equivalents falling within the spirit and scope of the disclosure as defined by the appended claims.